

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Apparatus for Cutting and Conveying Sheets from a Continuous Web

WE, INTERNATIONAL BUSINESS MACHINES CORPORATION, a Corporation organized and existing under the laws of the State of New York in the United States of America, of 5 Armonk, New York 10504, United States of America (assignees of Oliver Duane Johnson and David Watson Leach), do hereby declare the invention for which we pray that a patent may be granted to us, 10 and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for cutting and conveying sheets from a continuous web.

Machines, whereby a web on continuous material is printed and cut into a series of individual sheets or cards and fed into a drum for drying, are not new in the art. 20 The operation of cutting the web material into cards and the feeding of the cards has always been faced with difficulties as the speed of delivery increases, the thickness of the material decreases, and now an even 25 more serious problem as the length of the card has been increased. Furthermore, the thickness of material requires consideration for handling paper webs which are becoming more popular with the ever increasing 30 need and production of paper slips and the like.

It is a general object of the present invention to provide an improved sheet or card manufacturing apparatus capable of 35 handling sheets or cards of increased length.

According to the invention there is provided apparatus for cutting and conveying sheets from a continuous web comprising web delivering means, vacuum belt 40 means for gripping and conveying only the leading edge of the web, and cutting means disposed across the web and positioned between the web delivering means and the

vacuum belt means, wherein in operation the vacuum belt tends to move the web at 45 a higher speed than does the web delivering means whereby the web is maintained taut during the cutting operation.

In order that the invention may be more readily understood, reference is made to 50 the accompanying drawings, in which:—

Figure 1 is a front elevation, partially diagrammatic and schematic, of a sheet or card cutting and conveying apparatus embodying the invention and using timed 55 vacuum belts, certain parts being sectioned, or otherwise broken away to illustrate structural details of the apparatus;

Figure 2 is a side elevation, partially diagrammatic and schematic, of the sheet 60 or card cutting and conveying apparatus of Figure 1, certain parts being sectioned, or broken away to illustrate the structural details of the apparatus;

Figure 3 is a cross-section taken on the 65 line 3-3 of Figure 1 and illustrating the construction and co-operation of the delivery belt and the vacuum box.

Referring to Figures 1 and 2, a preferred embodiment of the invention is shown 70 diagrammatically for ease of illustration. A continuous web 10 is printed upon by means of the printing cylinder 11 and the co-operating roller 12 and is then delivered to the cut-off station comprising the cut-off 75 cylinders 13 and 14. As shown, the rollers 11 and 12 act as web delivering means. The web 10 is cut into cards of predetermined uniform length as it passes the cutter station. The advancing web 10 is pulled, 80 guided and delivered to a rotary drying wheel 21 by means of the timed vacuum belts 15.

The vacuum delivery apparatus comprises two flexible resilient, toothed, sprocket 85 driven belts 15. Each of the belts 15 have

sets of two or three holes 16 spaced approximately  $3/8$ ths of an inch apart (only two holes are shown in the preferred embodiment). The sets of holes are in  
 5 turned spaced a card length apart (which in the preferred embodiment is approximately  $15-7/8$ ths inches). While the spacings of the holes are given for the preferred embodiment, there is no intention to be  
 10 limited thereto. Other spacings may perform equally well for different length cards.

The belts 15 overlay the channels of a vacuum chamber 17. The vacuum chamber 17 may be suitably connected with any  
 15 vacuum pump or the like. Each of the belts 15 form a continuous loop supported and driven by the pulleys 18, 19 and 20. The belts 15 are driven at a slightly faster rate of speed than the web-feeding  
 20 mechanism for the purpose of keeping the web 10 taut and assuring an accurate card cut-off.

The rotary drying drum 21 includes a plurality of serially arranged and mechanically actuated card clips 22 which are  
 25 adapted to be closed upon a leading edge of a card 23 after it has been passed under a clip 22.

Proceeding with the description of the  
 30 transport of the web 10 and cards 23, as the leading edge of the web 10 moves to a point 24 at the leading edge of the vacuum chamber 17, the vacuum through the holes 16 in the belts 15 causes the web to be  
 35 pulled towards the belts 15. The vacuum serves to keep the leading edge of the web 10 in contact with the belts 15 and also keeps the web 10 taut during the cutting operation and serves to guide the leading  
 40 edge of the card 23 toward a clip 22 on the rotary drum 21. Since there are no additional holes in the belt 15 for the balance of the card length, the "tail" of the card 23 is free to be moved upward and  
 45 away from the belts 15 by the cut-off knife 13a. As the clip 22 in the rotary drum 21 closes on the card, the holes 16 in the belts 15 move over the terminal edge 25 of the vacuum chamber 17, thus freeing or releasing  
 50 the card 23 for movement by the drying drum 21 to enable an ink drying operation. The belts 15, which are approximately one-half inch longer than the combined length of two cards, will have another  
 55 series of two holes which will pick the leading edge of the web as it passes the leading point 24 of the vacuum chamber 17.

As it was previously noted, the belts 15  
 60 are driven slightly faster than the web 10 thereby keeping it taut and not allowing the card to buckle while assuring an accurate card cut-off. The lead holes of the belt 15 pick up the card at point 24  
 65 approximately  $5/16$ ths of an inch from the

leading edge of the card. By the time the card and belt have reached the final point 25 of the vacuum chamber 17, the lead hole will have moved relative to the card  
 70 until it is near to the leading edge of the card. The belts 15 are located near the lateral edges of the card to minimize ink tracking when backprinting is present and to permit the belts 15 to travel up on either  
 75 side of the rotary dryer drum 21 so that a card can be completely controlled until the leading edge has been positioned under a clip 22.

Another feature of the device is the capability of feeding the cards in an upward  
 80 direction in a vertical plane and under the clips 22 of the dryer drum 21.

Still another feature of the card transport mechanism resides in a deceleration of the cards as they are introduced under the clip  
 85 22 of the drying drum 21. The circumferential speed of the drying drum 21 is less than the speed of the belts 15 so that the cards are entered under the clip 21 in a manner such that the leading edge of the  
 90 card will not be damaged or mutilated. Edge damage to cards would render them useless. The clips 21 do not open wide, but merely enough to accept the cards.

Another notable feature is effected by  
 95 the cut-off knife 13a of the cut-off cylinder 13 which, as it completes the cut-off operation, will move the trailing edge of the cards away from the path of the new leading edge of the web 10 to facilitate the  
 100 engagement of the leading edge of the web 10 by the vacuum belts 15.

The combination of the deceleration of the cards and the movement due to the cut-off knife 13a leads to a shingling of the  
 105 cards.

#### WHAT WE CLAIM IS:—

1. Apparatus for cutting and conveying sheets from a continuous web comprising web delivering means, vacuum belt means  
 110 for gripping and conveying only the leading edge of the web, and cutting means disposed across the web and positioned between the web delivering means and the vacuum belt means, wherein in operation the vacuum  
 115 belt means tends to move the web at a higher speed than does the web delivering means, whereby the web is maintained taut during the cutting operation.

2. Apparatus as claimed in claim 1, in  
 120 which the vacuum belt means comprises a chamber from which air is continuously pumped, at least one opening in a wall of said chamber covered by a continuously moving belt means, and apertures in said  
 125 continuously moving belt means whereby the leading edge of the web is maintained in contact with the moving belt means when the apertures register with an opening by the difference between ambient pressure 130

and chamber pressure.

3. Apparatus as claimed in claim 2, in which the continuously moving belt means comprises a pair of parallel continuously moving belts extending longitudinally of the web and positioned so as to grip the web near the longitudinal edges thereof, each belt covering a respective opening comprising a longitudinal slot in a wall of said chamber.

4. Apparatus as claimed in claim 3, in which each moving belt is apertured by sets of perforations.

5. Apparatus as claimed in claim 4, in which the sets of perforations are spaced along the belt by distances substantially equal to the length of a cut sheet.

6. Apparatus as claimed in any preceding claim, in which the web delivering means comprises a printing cylinder and an associated roller between which the web passes.

7. Apparatus as claimed in any preceding claim, in which the vacuum belt means is arranged to transfer cut sheets to a

drying cylinder.

8. Apparatus as claimed in claim 7, in which the leading edge of each sheet is received into sheet supporting clips on the drying cylinder.

9. Apparatus as claimed in claim 7 or claim 8, in which the circumferential speed of the drying cylinder is less than the speed of the vacuum belt means.

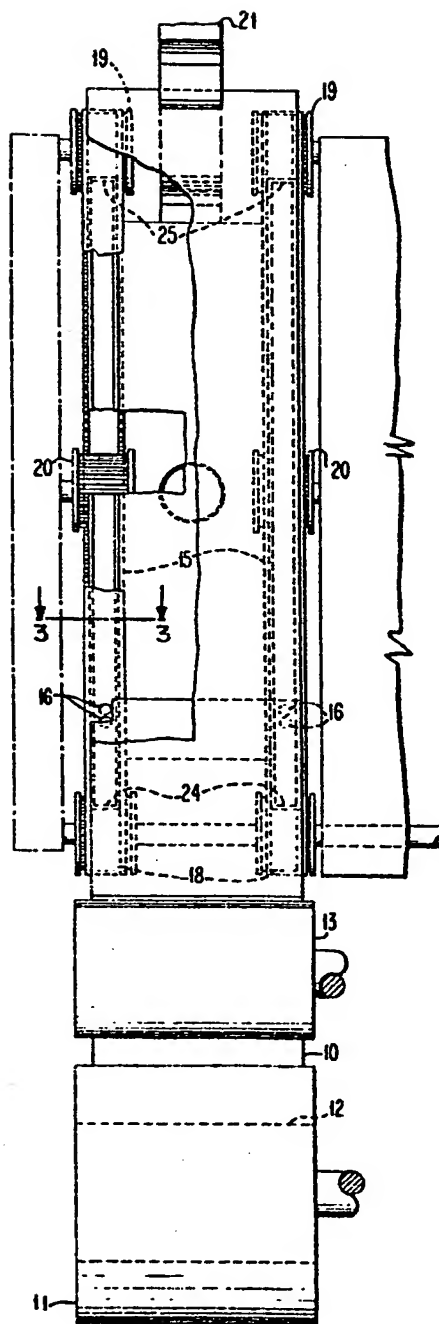
10. Apparatus as claimed in any preceding claim, in which the cutting means is operative to deflect the trailing edge of a cut sheet out of the path followed by the leading edge.

11. Apparatus as claimed in any preceding claim, in which the vacuum belt means is arranged vertically above the web delivery means.

12. Apparatus for cutting and conveying sheets, substantially as hereinbefore particularly described with reference to the accompanying drawings.

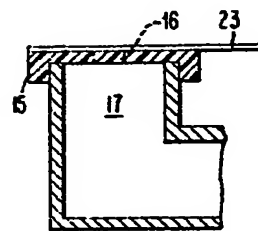
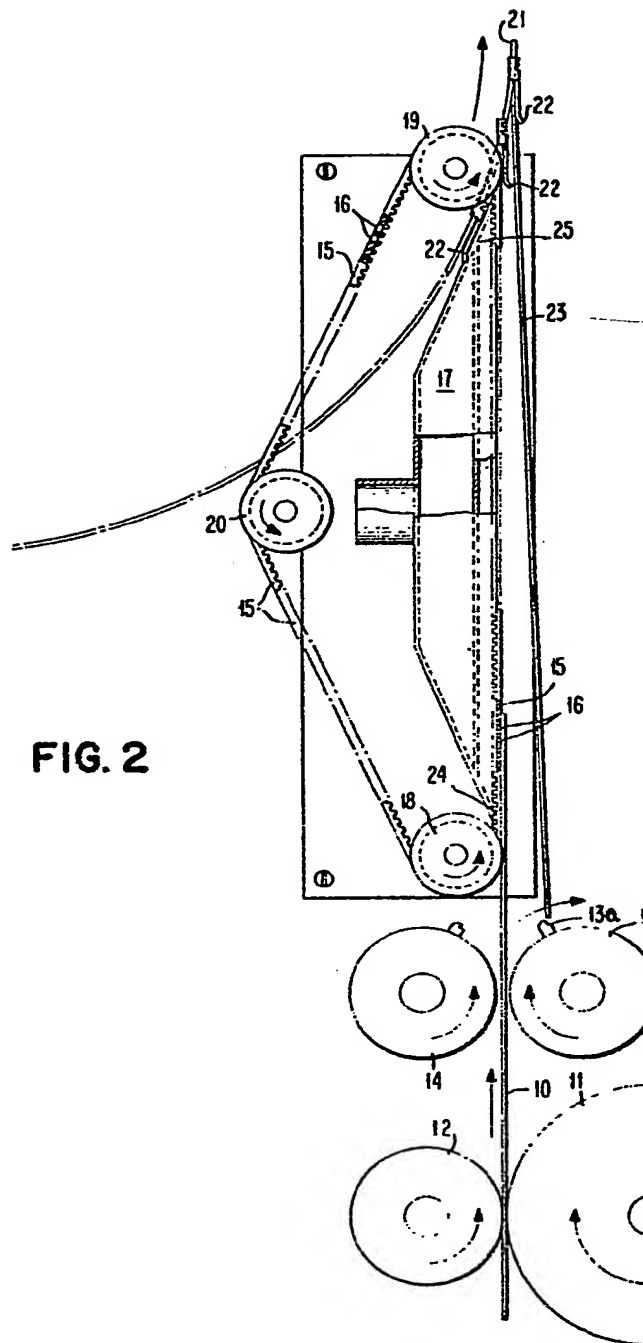
M. J. W. ATCHLEY,  
Chartered Patent Agent,  
Agent for the Applicants.

FIG. 1



**2 SHEETS**

**This drawing is a reproduction of  
the Original on a reduced scale.**  
**SHEETS 1 & 2**



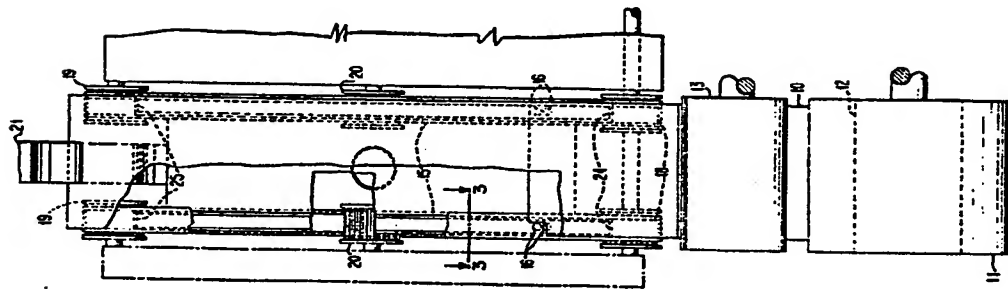


FIG. 1

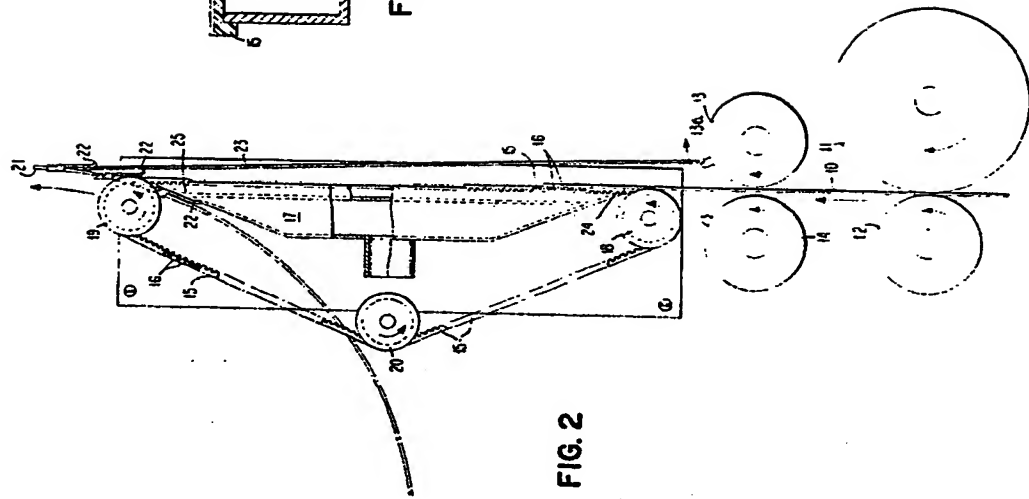


FIG. 2

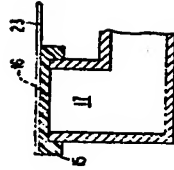


FIG. 3